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Indian Standard

TOLERANCES ON DIMENSIONS OF PLATES CUT BY FLAME

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MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
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June 1972

Indian Standard
TOLERANCES ON DIMENSIONS OF PLATES CUT BY FLAME

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Indian Standard
TOLERANCES ON DIMENSIONS OF PLATES CUT BY FLAME

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 30 December 1971, after the draft finalized by the Welding General Sectional Committee had been approved by the Structural and Welding Division Council.

0.2 The main object of this standard is to facilitate the fabrication industry to improve and simplify their production, to eliminate waste of time and material involved in production and to set up standards of quality and dimension.

0.3 Normally tolerances are specified for all important dimensions on the engineering drawings. The tolerances specified in this standard relate to dimensions of plates cut by flame either by hand or by machine.

0.4 This standard keeps in view the process capability, manufacturing and trade practices followed in the country in this field. Assistance has also been derived from the following standards issued by Ceskoslovenska Statni Norma:

CSN 1235 Welding of metals.
CSN 01 4450 Surface roughness of parts.
CSN 01 4481 Tolerances for flame cut plates.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard specifies the tolerances for dimensions of steel plates flame-cut by hand or machine.

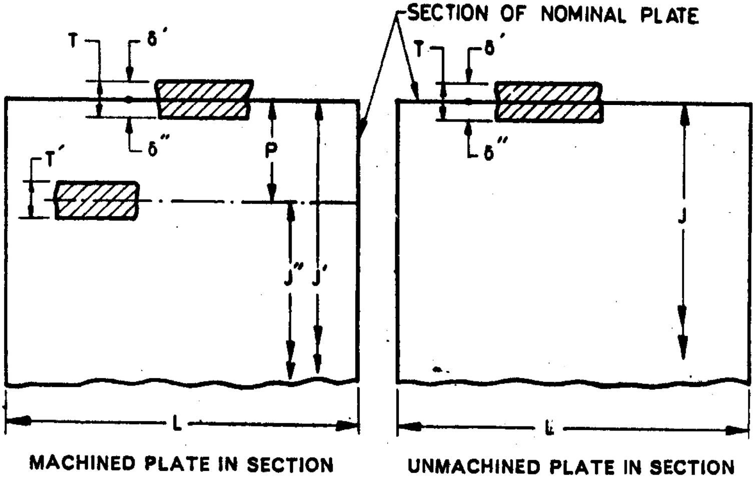
2. NOMINAL DIMENSIONS AND TOLERANCES

2.1 The nominal dimension, machining allowance and tolerances specified in this standard refer to dimensions indicated in Fig. 1.

---

*Rules for rounding off numerical values (*revised*).

2.2 The nominal dimension with machining allowance J' is calculated as $J' = J'' + P$. The nominal dimension of plates after machining J'' and the machining allowance P are specified in the production and technological documents. The tolerances for the dimensions J for unmachined flame-cut plates and J' for flame-cut plates with machining allowance are detailed in Fig. 1. The limiting deviations for the dimensions are given in Table 1.



L = length of cut

J = nominal dimension of the plate

J' = nominal dimension with machining allowance

J'' = nominal dimension of plate after machining

P = machining allowance

t = nominal thickness of plate

T = tolerance on dimension for flame cutting

T' = tolerance on dimension for machining (to be specified in production documents for machining)

δ' = upper deviation of nominal dimension

δ'' = lower deviation of nominal dimension

FIG. 1 SKETCH SHOWING NOMINAL DIMENSIONS AND DEVIATIONS IN MACHINED AND UNMACHINED PLATES

TABLE 1 LIMITING DEVIATIONS FOR DIMENSIONS OF FLAME-CUT PLATES

(*Clause* 2.2)

THICKNESS OF PLATE		LENGTH OF CUT L		PERMISSIBLE LIMITING DEVIATION		WIDTH OF CUT, *Max* $\approx s$		RADIUS OF EDGE $\approx r$
Over	Up to and Including	Over	Up to and Including	Class I Accuracy	Class II Accuracy	Cutting by Machine	Cutting by Hand	
mm	mm	mm	mm	mm	mm	mm	mm	mm
5	30	—	500	± 1	± 2	3	4	1·0
		500	2 500	± 1·5	± 2·5			
		2 500	5 000	± 2	± 3			
		5 000	7 500	± 2·5	± 3·5			
		7 500	10 000	± 3	± 4			
30	60	—	500	± 1·5	± 2·5	4	5	1·5
		500	2 500	± 2	± 3			
		2 500	5 000	± 2·5	± 4			
		5 000	7 500	± 3·5	± 5			
		7 500	10 000	± 4·5	± 6			
60	100	—	500	± 2·5	± 4	5	6	2·0
		500	2 500	± 3	± 5			
		2 500	5 000	± 3·5	± 6			
		5 000	7 500	± 4·5	± 7			
		7 500	10 000	± 5·5	± 8			

3. DEGREE OF ACCURACY

3.1 Flame-cut plates shall conform to one of the two grades of accuracy indicated below:

a) *Class I-Accuracy* — Tolerances should be specified in the production documents, if the plate has to be cut to Class I accuracy (*see* Table 1).

b) *Class II-Accuracy* — Tolerances may not be specified in the production documents (*see* Table 1).

3.1.1 The tolerances given in Table 1 are applicable on the dimensions of plates at ambient temperatures.

3.2 The tolerances for both classes of accuracies are shown in Table 1 with reference to the thickness of the plate t and the length of the cut L. This is not applicable for places, where material is defective. Tolerances shall be calculated and measured from upper edge of the section.

3.3 In case of plates with unequal sides, the tolerances shall be determined with reference to the longer side (*see* Fig. 2).

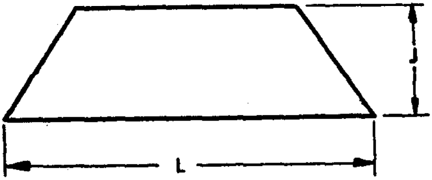


FIG. 2 PLATE OF UNEQUAL SIDES

3.4 For circular plates, the tolerance shall be determined with reference to the diameter D as the nominal dimension. The tolerances specified in Table 1 are not however applicable to circular plates where D is equal to t (plate thickness).

3.5 When the plates are flame-cut using templates, the tolerances shall be determined for maximum length of the cut. The actual shape of cut piece should lie in the deviation range shown in Fig. 3.

3.6 Perpendicularity — The two sides of the plate shall be perpendicular with the deviations not exceeding δ' and δ'' with reference to nominal dimensions as shown in Fig. 4.

4. WORKMANSHIP

4.1 Flame-cutting by hand or machine shall be differentiated by marking rhombus in white colour at intervals of one metre along the periphery of the proposed profile to be cut as shown below:

◇ FOR FLAME CUTTING BY HAND

◇ ◇ FOR FLAME CUTTING BY MACHINE

4.2 For plates to be flame-cut, the cutting torch shall be lead along the periphery of the profile such that the flame is tangential to the side to be cut as shown in Fig. 5. The line of cut shall punch mark.

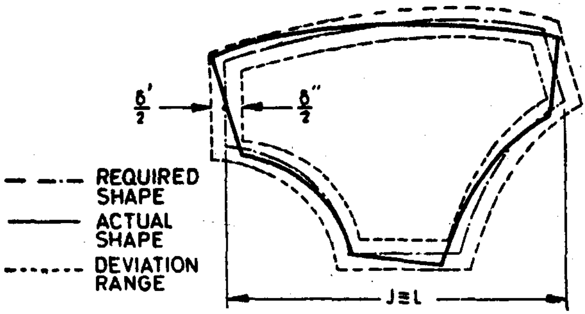


FIG. 3 RANGE OF DEVIATION FOR PLATES CUT USING TEMPLATE

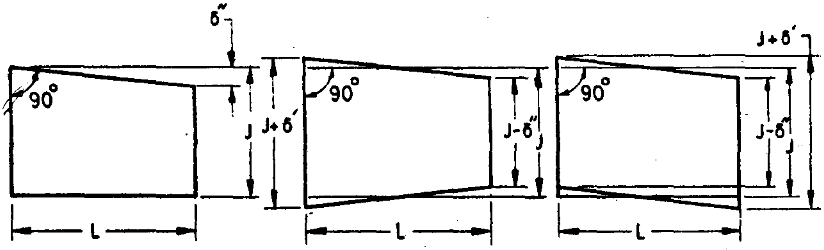


FIG. 4 PERPENDICULARITY OF SIDES IN PLATES

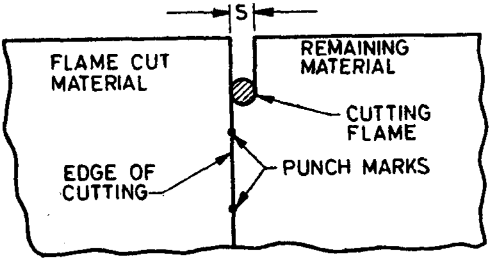


FIG. 5 LOCATION OF FLAME WHILE CUTTING PLATES

4.3 The cut shall be square and the concavity due to cutting shall be limited to 4 percent of thickness if cut by hand and 2 percent of thickness if cut by machine (*see* Fig. 6).

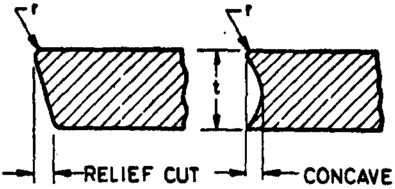


FIG. 6 RELIEF CUT AND CONCAVITY

4.4 Radius of Corners — The permissible radius of corners of the cut plates shall be as given in Table 1 with reference to Fig. 6 and 7.

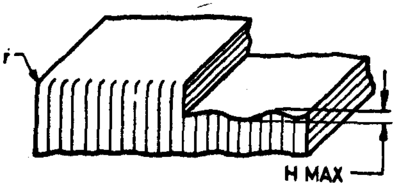


FIG. 7 SURFACE ROUGHNESS OF THE CUT PLATE

4.5 The permissible surface roughness for flame cutting in microns shall be as follows:

	Accuracy	*Surface Roughness, Max*
Flame cutting by machine	Class I	50
	Class II	100
Flame cutting by hand	Class I	200
	Class II	500

4.6 Distortion — Distortion on flame-cut plates shall not exceed 3 mm per metre or 10 mm whichever is more.

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